

usually require the largest amount of material to be between 40 and 140 mesh.

In general, the yield of sand after attrition scrubbing of samples from the individual drill holes was between 62.4 and 80.3% by weight whereas the final yield of sand after magnetic separation (the non-magnetic product) ranged from 59.3 to 72.7% (Table 2). The yield of sand after flotation and magnetic separation ranged from 73.8 to 78.9% (Table 3). The final yield of non-magnetic product from the composite sample by attrition scrubbing ranged from 74.6 to 78.8% (Table 4).

The influence of such variables, such as pH, scrubbing time, and % solids on the final yield of sand was not significant (Table 4).

Raw samples contained an insignificant amount of heavy minerals. All of the heavy liquid separations yielded float products greater than 99% of the weight and less than 0.5% in the sink product.

Chemical analysis of the samples from individual drill holes revealed that all the major impurities associated with sand were low and within the chemical specifications for glass sand (Table 4). Iron was below 0.04% Fe_2O_3 , magnesium was below the detection limit of 0.05% MgO , aluminum ranged from 0.34% to 0.13% Al_2O_3 and titanium ranged from 0.03% TiO_2 to less than the detection limit of 0.01% TiO_2 . For the composite samples, titanium and aluminum impurities were slightly higher but were still well within specifications for glass sand. Trace elements such as Zn, Pb, Mo, Cu, and Cr in all of the samples also were very low and measured in parts-per-million.

The iron minerals products from the flotation tests were used for the x-ray diffraction analysis. These samples contained mostly quartz and minute amounts of other heavy minerals. After separation of the quartz from the bulk of the sample under a microscope, the x-ray analysis of the remaining sample indicated the presence of schorl (tourmaline), zircon, and rutile. When viewed under the microscope, most of the grain sizes had a dark reddish-brown color. This could have been an indication that fractions of the quartz were stained with goethite and hematite, or the color could have indicated the presence of the minerals mentioned above, schorl, zircon, and rutile. The mica flotation product also contained a fair amount of quartz (40%), but trace minerals such as kaolinite and muscovite were also detected. Feldspar was not detectable in the sample as indicated by XRD or binocular microscopy.

RESOURCE POTENTIAL GLASS SAND RESOURCES

The Pinehurst Formation, as mapped on the 1985 Geologic Map of North Carolina, covers approximately 120,660 acres in Richmond, Scotland, Moore and Hoke counties. Some Pinehurst outcrop underlies North Carolina Game Lands. Commercial glass sand is being produced from a nearby site operated by the Unimin Corporation from the Pinehurst Formation (see Figure 8). Because of the large area of game lands, the available land for glass sand exploration is substantially restricted.